alberta pork production handbook

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Alberta
AGRICULTURE
Pork Industry Branch

Feed Additives for Swine

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Feed additives are widely used in the swine industry as a means of reducing production costs and increasing the profitability of producing pork. There are numerous feed additives or medications on the market, each with its specific set of uses. Directions for the proper use of all approved medications can be found in publications from the Government of Canada.

A. Regulations

The Feeds Act, and its associated regulations, sets out the standards for animal feeds in Canada. All feeds come under the scope of the Act, including those mixed and used on farms. The "Compendium of Medicating Ingredient Brochures" (MIB) lists those medications and other additives that can be included in feeds. It sets out the levels and combinations allowed for each animal class, and specifies any withdrawal period necessary before marketing the animal. Until recently, all feeds containing medications at MIB specified levels required registration with Agriculture Canada. Changes in the Feeds Regulations now allow producers to add and mix medications in feeds on the farm, as long as MIB specified drugs and levels are fed. A Medicated Feed Users Guide, available from Agriculture Canada, assists producers in interpreting proper medication use. In addition to the MIB, there are several trade memoranda associated with the Act which specify other requirements under the Act such as the maximum amount of copper that can be included in feeds, and the maximum levels of vitamins that can be guaranteed on feed labels. Before any medication or chemical is allowed to be included in feeds, it has to satisfy two criteria: safety and efficacy. With these recent Feed Regulation changes, purity and freedom from residue in meat products will be emphasized, and monitored with **more direct responsibility given to producers.** Enforcement of the Act is carried out by federal inspectors.

B. Purpose of Additives

Additives are included in swine feeds to:
- prevent or treat specific disease conditions
- improve growth rate and feed conversion efficiency
- minimize the effects of stress
- control internal parasites
- increase conception rate and litter size.

C. Types of Additives

The additives commonly used in swine feeds include antibiotics, chemotherapeutics, anthelmintics and probiotics.

1. Antibiotics

These are compounds synthesized by living organisms (usually bacteria or molds) that inhibit the growth of another organism. They are considered to act in improving animal performance by killing or inhibiting the growth of harmful or potentially harmful bacteria in the intestinal tract of the animal. Some affect a relatively small number of organisms (narrow spectrum) while others are active against a wide variety of organisms (broad spectrum). High levels (100 - 200 g/tonne) are included in feed for disease treatment while intermediate levels (50 g/tonne) are used for disease prevention. Low levels (10 g/tonne) are used for growth promotion.

2. Chemotherapeutics (drugs)

These are organic compounds with properties similar to antibiotics. Unlike antibiotics, they are manufactured chemically.

3. Anthelmintics

These drugs are used for deworming. They are organic compounds and are generally used over a short interval. Dichlorvos, fenbendazole, hygromycin B, piperazine, and pyrantel tartrate are such drugs; the choice depends on the type of worm problem (See table 1.) A veterinarian should be consulted for advice on the appropriate deworming drug.

Gilts should be dewormed 5 to 10 days before breeding and both gilts and sows at 10 to 14 days before farrowing. Follow label directions of the dewormer for proper use. Boars should be dewormed at least twice a year. Weanlings should be dewormed once after they are successfully started.

4. Probiotics

These are live microbial products mainly yeast and bacteria which, when fed to pigs, implant themselves in the gut and block the growth of intestinal bacteria that are potentially harmful. This action will spare the pig the toxic effect of disease producing organisms and any subsequent intestinal disease. Depending on stated effects, they may be cleared as feeds, drugs or veterinary biologics. To be used as feed ingredients, their effect would be to maintain appetite, weight gain, feed efficiency and other production parameters under normal conditions of animal husbandry. Regulatory changes now stipulate that a minimum guarantee of viable microbial activity (colony forming units per gram or kilogram) is required, as well as the purity and origin of these bacteria.

D. Additives for Weanling Pigs

Medications are added to hog starter feeds to help young pigs cope with stress, which often results in gut infections such as those causing scours. They are especially useful since resistance to infection is low in young pigs and many herds contain endemic infections. Stress resulting from being moved to another barn or to the auction mart may further lower resistance at this time. Giving a medicated feed promotes good health, increases growth rate and feed efficiency, and lowers death losses. Some medications used in starter feeds are restricted in use and may only be fed up to certain body weights or for specific periods of time. Table 2 lists a number of these medications under the headings enteritis, dysentery and stress.

Veterinary advice should be sought in choosing a medication to aid in the prevention or treatment of persistent scours.

Table 1: Drugs Effective for Particular Worm Problems [1]

Deworming Drugs	Whipworms	Roundworm	Nodular Worms	Stomach Worms	Intestinal Threadworms
Dichlorvos	Yes	Yes	Yes	No	No
Fenbendazole	Yes	Yes	Yes	No	No
Hygromycin B	No	Yes	Yes	No	No
Levamisole	No	Yes	Yes	Yes	Yes
Piperazine	No	Yes	Yes	No	No
Pyrantel Tartrate	No	Yes	No	No	No

[1] Permitted as feed additives.

E. Additives for Prevention and Treatment of Swine Dysentry

A more serious type of scours, known as swine dysentry, bloody scours, black scours or vibronic dysentry, can also be prevented or treated with medicated feed. This problem occurs most frequently in 8 to 14 week old pigs. Typically, affected pigs pass loose feces containing blood and mucus. There are several medications effective against dysentery as listed in table 2.

F. Additives for Growing and Finishing Swine

Problems of stress and scours are usually solved by the time pigs reach this age. Growth response to antibiotics is generally not economically warranted at this stage of production. Most producers consider the risk of drug residue problems greater than either the necessity for or the economic benefits of antibiotic usage during these stages. Persistent disease problems or sporadic outbreaks sometimes warrant treatment with antibiotics during this stage. It is recommended, however, that the herd veterinarian be consulted before starting to treat a specific herd problem.

G. Additives for Sows

Antibiotics have been shown to be effective when fed to breeding animals at certain critical stages of the production cycle. A high level of about 1 g/sow/day of an absorbable antibiotic (such as one of the tetracyclines) may result in higher conception rate (approx. 10%) and increased litter size (approx. 0.5 pig) at subsequent farrowing. Inclusion of antibiotics in the feed around farrowing and during lactation may reduce the incidence of agalactia and uterine infections that occasionally occur in sows shortly after farrowing. It has also been shown that both survival rate and weaning weight of the litter may be increased when sows are fed antibiotics during lactation. There are no clearances in the MIB, however, for feeding antibiotics to sows for these purposes, therefore veterinary advice and supervision must be sought in this regard.

H. Choice of Feed Additives

Selection of a specific feed additive and the level needed for the best response will vary with the existing disease condition, farm environment and stage of the production cycle. Therefore, veterinary advice may be sought on the choice of a feed additive. Table 2 gives the proper usage of the approved additives according to disease conditions. A veterinarian may issue a prescription to allow a higher level of drug to be used than that allowed for general use if it is necessary. Table 3 lists the approved brands of additives available for use in swine feeds.

I. Withdrawal Periods

To be effective, a feed additive must get to that part of the animal where the infectious agents are located. This means that the feed additives will pass through some animal tissues and may be retained in the meat. Therefore, some feed additives have to be withdrawn from the animals' feed for a minimum length of time before the animal can be slaughtered for human consumption. The withdrawal period simply permits sufficient time for an animal to excrete and dispose of the feed additive from its body before it is slaughtered, thus assuring a carcass that meets the standards for human consumption. The withdrawal period will vary depending on the kind of feed additive.

Producers must ensure that the appropriate withdrawal periods are observed. Failure to do so is likely to result in unacceptable residues in the carcass, **making the farmer liable to prosecution** under the Food and Drug Act. Under the Act, drug residues in carcasses are monitored as part of a meat safety program. Increased emphasis has recently been placed on monitoring carcass residue levels.

J. Proper Use of Feed Additives

1. Read the tag and be sure to use medicated feed for the right stage of production and for tested and approved reasons.
2. Observe withdrawal periods to avoid residues and to ensure safe and wholesome pork.
3. Use medicated feeds only for the purpose and species indicated. Drugs that are effective and approved for use in other species may not be effective in swine.
4. Use drugs only at the levels recommended by the manufacturer or veterinarian. These levels are proven efficacious and safe. Too low a level may cause resistance to develop in the disease organism while too high a level may be toxic to the animal.
5. Do not give additional drugs through water medication or by injection to animals on medicated feed without veterinary approval. One drug may interfere with the effectiveness of another drug or together they may be toxic.
6. Do not permit other drugs to contaminate medicated or non-medicated feeds through mixer contamination or other means. Sequence feed mixing so that any possible carryover of medicated feed is into feed for animals not being shipped. Otherwise, flush the feed system and retain the flush material as a component of medicated feed when it is mixed next time.

Table 2. Additives Allowed in Swine Feeds

Additive (MIB Reference In Brackets)	Level Permitted In Feed g/tonne	Type of Feed	Purpose of Additive	Duration of Feeding	Withdrawal (days)
			ENTERITIS		
Bacitracin zinc (37A)	55	Grower/Finisher	Prevention	Up to market weight	0
	110	Grower/Finisher	Treatment	5 - 15 days	0
Chlortetracycline hydrochloride (34)	55	Starter	Prevention	Up to 32 kg body weight	7
	110	Grower	Treatment	Until 3 days after symptoms disappear	7
Chlortetracycline hydrochloride/ Furazolidone (34A)	110/110	Grower	Prevention	Up to 7 days before slaughter	7
	110/110	Grower	Treatment	10 - 14 days	7
Chlortetracycline hydrochloride/ sulfamethazine/ procaine penicillin (38)	110/110/55	Starter	Prevention	Up to 32 kg body weight	10
	110/110/55	Starter	Treatment	Until 3 days after symptoms disappear	10
Furazolidone (11)	330	All Classes	Treatment	10 - 14 days	5
Oxtetracycline hydrochloride (35)	220	Prestarter	Prevention/ Treatment	Up to 6 weeks of age	7
	55	Starter	Prevention	Up to 31 kg body weight	7
	110	Grower/Finisher	Treatment	Until 3 days after symptoms disappear	7
Oxytetracycline hydrochloride/ furazolidone (35, 11)	220/330	Starter	Treatment	10 - 14 days (up to 6 weeks of age)	7
	110/330	Grower/Finisher	Treatment	10 - 14 days	7
Procaine penicillin/ streptomycin (36)	27.6/82.67	Starter/Grower/ Finisher	Treatment	Until 3 days after symptoms disappear	0
Tylosin phosphate/ furazolidone (60)	44/220	Starter	Prevention	21 days	5
			DYSENTERY		
Carbadox (53)	55	Starter	Prevention	Up to 35 days before slaughter	35
Chlortetracycline/ sulfamethazine/ procaine penicillin (38)	110/110/55	Starter	Prevention	Up to 32 kg body weight	10
	110/110/55	Starter	Treatment	Until 3 days after symptoms disappear	10
Dimetridazole (33)	150	Starter/Grower/ Finisher	Prevention	Up to 5 days before slaughter	5

Additive (MIB Reference In Brackets)	Level Permitted In Feed g/tonne	Type of Feed	Purpose of Additive	Duration of Feeding	Withdrawal (days)
Furazolidone (11)	330	All Classes	Treatment	10 - 14 days	5
Lincomycin (68)	110 44	Starter/Grower/ Finisher	Treatment and Control	Higher level for up to 3 weeks followed by lower level for 4 weeks	0
Lincomycin/ spectinomycin (62)	22/22	Starter/Grower	Prevention	Up to 57 kg body weight	1
Ronidazole (59)	60	Starter/Grower/ Finisher	Prevention	Continuously from 5 weeks of age	3
Tylosin phosphate (43)	44	Starter/Grower/ Finisher	Prevention	Up to 2 days before slaughter	0
	110	Starter/Grower/ Finisher	Treatment	21 days	2
Tylosin phosphate/ furazolidone (60)	44/220	Starter	Prevention	21 days	5
Virginiamycin (63)	110 55	Starter/Grower/ Finisher	Treatment and Control	Higher level for 2 weeks followed by lower level for 4 weeks	0
GROWTH PROMOTION (G.P.)					
Arsanilic Acid (4)	50-99	Grower/Finisher	G.P.	Up to 5 days before slaughter	5
Bacitracin zinc, methylene disalicylate (10.2)	4.4	Grower/Finisher	G.P.	Up to market weight	0
Chlortetracycline hydrochloride (10.1)	5.5	Grower/Finisher	G.P.	Up to market weight	0
Oxytetracycline hydrochloride (10.9)	5.5	Grower/Finisher	G.P.	Up to market weight	0
Penicillin/ Streptomycin (10.8)	27.5	Grower/Finisher	G.P.	Up to market weight	0
3-Nitro-4 hydroxyphenyl-arsonic acid (21)	25-50	Grower/Finisher	G.P.	Up to 5 days before slaughter	5
Tylosin phosphate (10.10)	44	Starter	G.P.	Throughout starter period (8 wk)	0
	22	Grower	G.P.	Up to market weight	0
	11	Finisher	G.P.	Up to market weight	0
Virginiamycin (10.11)	11	Grower	G.P.	Up to market weight	0

Additive (MIB Reference In Brackets)	Level Permitted In Feed g/tonne	Type of Feed	Purpose of Additive	Duration of Feeding	Withdrawal (days)
			STRESS		
Carbadox (53)	55	Starter	Improve weight gains and feed efficiency	Up to 35 kg body weight	35
Chlortetracycline hydrochloride (34)	110	Starter/Grower	Maintain weight gains and improve appetite	Up to 10 days after stress condition is eliminated	7
Chlortetracycline hydrochloride/ sulfamethazine/ procaine penicillin (38)	110/110/55	Pre-starter/ Starter	Maintain weight gains and stimulate appetite	Up to 10 days after stress condition is eliminated	10
Oxytetracycline hydrochloride (35)	110	Starter/Grower/ Finisher	Maintain weight gains and stimulate appetite	Up to 10 days after stress condition is eliminated	7
			WORMS		
Dichlorvos (65)	384 528	Grower Boar, Sow	Deworming Deworming	Weaning to 45 kg body weight 2 days	14 14
Fenbendazole (72)	100	Starter/Grower/ Finisher/Sow	Deworming	3 days	0
Hygromycin B (20)	13.2 13.2	Starter Sow	Deworming Deworming	Weaning to 45 kg body weight For 8 weeks before farrowing	2 2
Levamisole	See directions		Deworming	1 day	1
Piperazine (19)	2960	Starter/Grower/ Finisher/Sow	Deworming	1 day	1
Pyrantel Tartrate (64)	See label directions		Deworming	5 - 7 weeks	7
			OTHER MEDICAL USES		
Chlortetracycline hydrochloride (34)	55	Starter/Grower/ Finisher	Maintain weight gains in the presence of atrophic rhinitis	As long as symptoms of atrophic rhinitis persist	7
Chlortetracycline hydrochloride sulfamethazine/ procaine penicillin (38)	110/110/55	Starter	Maintain weight gains in the presence of atrophic rhinitis	As long as symptoms of atrophic rhinitis persist	10

Additive (MIB Reference In Brackets)	Level Permitted In Feed g/tonne	Type of Feed	Purpose of Additive	Duration of Feeding	Withdrawal (days)
Lincomycin hydrochloride (68)	220	Grower	Reduce severity of mycoplasmal pneumonia	21 days	0
Oxytetracycline hydrochloride (35)	55	Starter/Grower/ Finisher	Maintain weight gains in the presence of atrophic rhinitis	As long as symptoms of atrophic rhinitis persist	7
Oxytetracycline hydrochloride (35)	550	Sow Feed for infected sows	Reduce the incidence of abortion in swine caused by Leptospirosis	14 days	7
Thyroactive iodinated casein (30)	227	Lactating sow	Stimulate milk production	3 days before farrowing until pigs are weaned	0

Source: Medicating Ingredients Brochures (MIB)
Food Production and Inspection Branch
Agriculture Canada

Table 3: Approved Brands of Feed Additives Available.

Arsanilic acid	Arsanilic acid 20%; Pro-Gen 20
Bacitracin methylene disalycylate	Fortracin 25
Carbadox	Mecadox 22, Mecadox 55
Chlortetracycline hydrochloride	Aureomycin 10, 50, 50G, 100G, Chlorachel 50, Chlor 50, 100
Chlortetracycline hydrochloride/ sulfamethazine/procaine penicillin	Aureo SP250, Aureo SP250G, Aureo SP250 Conc. Aureomix 500G, Aureomix 625G, Chlor 250, Chlorachel 250, Super Chloracel 250, Super Chlor 250
Dichlorvas	Atgard C
Dimetridazole	Emtryl, Dimetridazole 30%
Fenbendazole	Safe-Guard 20%
Furazolidone	Diszone, Heber Roxone, Furazolidone, Furamedic
Hygromycin B	Hygromix, Shur-Gain Hygromix, Co-op Hygromix
Lincomycin	Lincomix

Lincomycin/Streptomycin	L-S 20
3-nitro-4-hydroxyphenylarsonic acid	3-nitro-hydroxyphenylarsonic acid, 3-Nitro, 3-nitro-4-hydroxyphenylarsonic acid product
Oxytetracycline hydrochloride	TM, Oxysol, Oxytetracycline 50 Premix
Piperazine	Piprazine Wormer, Piperazine dihydrochloride, Ascarex D
Procaine penicillin/Streptomycin	Pro-Strep
Pyrantel tartrate	Pro-Banminth
Ronidazole	Ridzol
Thyroactive iodinated casein	Protamone
Tylosin phosphate	Co-op Tylan 10, Shur-Gain Tylan 10, Tylan 10 Premix, Tylan 40 Premix, Tylosin 10 Premix
Tylosin phosphate/furazolidone	Tylazone 240, Shur-Gain Tylazone 240, Tylazone 480, Shur-Gain Tylazone 480
Tylosin phosphate/Sulfamethazine	Tylan 50/Sulfa G Premix, Shur-Gain Tylan 50/Sulfa G Premix
Virginiamycin	Stafac
Zinc Bacitracin	Baciferm 50, Bacitracin 50, Zinc Bacitracin 50

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